

suggest positioning an image on a nonplanar surface to indicate a direction of gaze and enhance nonverbal communication associated with facial features.

In rejecting claims 1, 21 and 30 on page 2 of the Office Action, the Examiner asserts that:

... Utt discloses the same method and apparatus for displaying facial feature[s] comprising a non-planar surface (See Utt [0038]); an image generation device that creates an image with facial features on the non-planar surface (See Utt [0011, lines 1-5], [0012, lines 2-5]).

It is noted that although Utt provides a positioning system (See Utt [0059, lines 1- 10]), it is silent about positioning the image on the non-planar surface to indicate a direction of gaze and enhance nonverbal communication associated with the facial features.

The Examiner therefore cites to the newly relied upon Yuasa patent and asserts on page 3 of the Office Action that:

However, Yuasa discloses a positioning system which positions the image on the non-planar surface to indicate a direction of gaze and enhance nonverbal communication associated with the facial features (See Yuasa col. 8, lines 34-67).

Therefore, it is considered obvious that one skilled in the art at the time of the invention would recognize the advantage of modifying Utt's positioning system by providing Yuasa's positioning system which positions the image on the nonplanar surface to indicate a direction of gaze and enhance nonverbal communication associated with the facial features. The motivation for performing such a modification in Utt is to avoid problems such as not capturing a recognition object in an image, which results in an incorrect pattern recognition extraction as taught by Yuasa (See Yuasa col. 2, lines 47-55).

Applicant respectfully disagrees with the foregoing assertions. None of the documents relied upon by the Examiner, considered individually or in the various combinations relied upon by the Examiner, teach or suggest Applicant's invention as recited in independent claims 1, 21 and 30. For example, neither of these

documents, regardless of whether they are considered individually or in combination, disclose or suggest positioning an image on a nonplanar surface to indicate a direction of gaze and enhance nonverbal combination associated with facial features (e.g., positioning a direction of an image of a user's eyes). Such a feature is broadly encompassed by independent claims 1, 21 and 30. The documents relied upon in the Office Action teach away from such a feature, and any effort to have combined features from the cited patent documents in the manner suggested by the Examiner would not have yielded predictable results.

Applicant's exemplary Figure 1 illustrates a video system using a nonplanar display 102 with facial features 104. The nonplanar display 102 can, for example, be a three-dimensional head shape with an image-generating display surface. The display surface can be formed from flexible area-conserving protective display patches which are tiled to cover the surface of a nonplanar head. See, for example, paragraphs [0018] and [0019]. A computer or other processing apparatus can be provided to position the image to appear on each display patch so that facial features appear seamless to a local user.

Figure 2 illustrates an exemplary embodiment that collects prospective images to help preserve eye contact, gaze information and other nonverbal cues of a local user, on a head-shaped nonplanar display 204. Figures 4A, 4B and 4C illustrate exemplary embodiments for generating facial images on a nonplanar surface. For example, using projectors 410, 412 and 414, the image of a remote user can be kept centered on the centered axis of a nonplanar display surface 416.

Figure 5 shows an exemplary method which includes gathering and displaying facial features of a user on a nonplanar display. One or more cameras can be used

to gather the images and display them on the nonplanar display device, as described in paragraph [0033].

A positioning system can be used to position an image (e.g., an image of the user's eyes) on the nonplanar display surface to indicate a gaze of the user (step 504). Cameras positioned on the nonplanar display near the local user can collect images of the local user's facial image or expression in step 506. Images of the local user are then transmitted for display on the nonplanar display of the remote user in step 508.

The foregoing features are broadly encompassed by Applicant's independent claims 1, 21 and 30, and are neither taught nor suggested by the documents relied upon by the Examiner. Exemplary embodiments can position an image to indicate a direction of gaze (e.g., eye position) of an individual whose facial features are being displayed. The Utt and Yuasa documents disclose a display of an image, but neither discloses positioning the image to indicate a direction of gaze.

The Utt patent document describes a display surface having a three dimensional convex shape, and a projection system, such as the Figure 1 projector 3 which projects onto the display surface 5. Utt simply displays a fixed image (e.g., the image of a planet or an image of a person's head). As acknowledged by the Examiner, Utt fails to disclose or suggest a "positioning system" that positions an image on a nonplanar surface to indicate a direction of gaze and enhance nonverbal communication associated with facial features.

The newly cited Yuasa document does not overcome the deficiencies of the Utt patent. In the sentence bridging pages 2-3 of the Office Action, the Examiner acknowledges that Utt:

is silent about positioning the image on the non-planar surface to indicate a description of gaze and enhance nonverbal communication associated with the facial features.

The Examiner therefore relies on the Yuasa patent at column 8, lines 34-67 as allegedly disclosing such a feature. However, the Yuasa patent is merely directed to putting a face image into an image processing apparatus to, for example, perform image recognition (see col. 12, lines 15-18). Although a gaze direction is detected, it is not used to position any image as presently claimed. The portion of the Yuasa patent cited by the Examiner at col. 8, lines 34-67 is used in an image recognition apparatus to facilitate accurate recognition of a pupil area in a facial image (see col. 8, lines 52-59). Yuasa does not teach or suggest a positioning system that positions the image on a nonplanar surface to indicate a direction of gaze and enhance nonverbal communication associated with the facial features.

The Utt and Yuasa patents, considered individually or in the combination relied upon by the Examiner, therefore do not teach or suggest all elements of Applicant's claim 1. Because the documents relied upon fail to teach or suggest an element of claim 1, claim 1 is allowable.

The Examiner's proposed combination of the Utt and Yuasa systems would not have resulted in positioning an image on a nonplanar surface to indicate a direction of eye gaze. It is not even clear why one skilled in the art would have combined features of the Utt and Yuasa patents. Utt is directed to the output, or displaying of an image, and Yuasa is directed to detecting features of an input image for purposes of image recognition. Neither are directed to positioning of an image on a nonplanar surface to indicate a direction of gaze and enhance nonverbal communication, as is presently claimed. Applicant's presently claimed invention

would not have been the predictable result of combining features from the Utt and Yuasa patent documents, and features of these documents would not have been readily substitutable to achieve the presently claimed invention.

Thus, there would have been no basis for combining features of the Utt and Yuasa documents in the manner suggested by the Examiner. Moreover, even if features of these documents could have been combined, the presently claimed invention would not have resulted. Neither of these documents teach or suggest a system which positions an image on a **nonplanar surface** to indicate a direction of gaze and enhance nonverbal communication associated with facial features.

As such, the apparatus of Applicant's independent claim 1 is allowable. Similarly, independent claims 21 and 30 are allowable.

Applicant's dependent claims are also allowable. The remaining documents relied upon in the rejection of the dependent claims do not overcome the deficiencies of the Utt and Yuasa documents.

The Trivedi patent document does not disclose or suggest a "positioning system" as claimed by Applicant. Trivedi does not disclose or suggest a system which positions an image on a **nonplanar surface** to indicate a direction of gaze and enhance nonverbal communication associated with facial features.

The Trivedi document is directed to a digital video imaging system for transforming warped video images into rectilinear video images. Paragraph [0041] of the Trivedi document refers to a video processing device 120 as being, for example, a "desktop computer". Trivedi is directed to a video system which can be installed in vehicles to assist pilots, drivers and security personnel to monitor a passenger cabin and luggage cabin, as described in paragraph [0038]. In paragraph

[0075], a driver's viewing direction is described as being computed from a filtered face orientation and driver's direction to an omniscam. A driver's view video can be generated from the omniscam video (e.g., 360 degree view) with a fixed zooming factor to approximate a human field of view as illustrated in Figure 15 of the Trivedi patent document. Paragraph [0085] of the Trivedi patent publication describes estimation of eye-gaze direction for providing a driving view. A rough estimate of a driver's gazing direction is described as being estimated from a driver's face orientation.

The system described in the Trivedi patent document is directed to determining and tracking a person's face orientation. This face detection and tracking is used in applications, such as analyzing the face pose of players at a casino table as described in paragraph [0091]. Other applications include video surveillance as described, for example, at paragraph [0093].

There is no disclosure in the Trivedi patent document of Applicant's claim 1 "positioning system". Trivedi does not disclose how any information acquired using the system disclosed therein can be used to position an image on a **nonplanar** surface. The system disclosed in the Trivedi document merely displays sensed information on a planar video display, such as the devices 121 and 122 of Figure 2.

At best, any combination of the Utt, Yuasa and Trivedi patent documents would have resulted in using the signal processing of the Trivedi patent to transform an image produced by the projector 3 of the Utt patent document into a rectilinear image. Such image processing clearly teaches away from the presently claimed invention, which is specifically directed to positioning an image on a nonplanar

surface to indicate a direction of gaze and enhance nonverbal communication associated with the facial features.

The Kalt patent was cited in the rejection of dependent claims 8-9 as disclosing a flexible display. This document fails to overcome the deficiencies of the documents discussed above.

Applicant's dependent claims recite additional advantageous features which further distinguish over the documents relied upon by the Examiner such that these claims, along with independent claims 1, 21 and 30, are allowable.


As such, the present application is considered to be in condition for allowance and Notice of Allowance is respectfully solicited.

Respectfully submitted,

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